AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

1.   (Currently Amended) A data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, ~~the file~~ the data storage medium storing data content comprising:

address information for a root directory; and

root directory file management information that includes start address information for an unrecorded area existing in a volume space, ~~the start address information being recorded in the volume space as part of root directory file management information~~, the root directory file management information being configured to be updated when a new file is recorded on the data storage medium by storing new root directory file management information in the unrecorded area for which start address information is recorded

~~wherein the unrecorded area for which start address information is recorded is used for updating root directory file management information when a new file is recorded on the data storage medium.~~

2. (Currently Amended) A data storage medium as described in claim 1, wherein the start address information is recorded using an indirect entry ~~for managing~~ that manages a root directory file recording area.

3. (Currently Amended) A data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, ~~the file~~ the data storage medium storing data content comprising:

address information for a root directory;

invalid data not used for retrieving volume/file structure data, ~~the invalid data being recorded before and after volume/file structure and a data file~~; and

root directory file management information, the root directory file management information comprising invalid extent management information ~~for managing~~ that manages an invalid data recording area, ~~the invalid extent management information being recorded in a volume space as part of root directory file management information~~.

4. (Currently Amended) A data storage medium as described in claim 3, wherein the invalid extent management information is recorded using an allocation descriptor ~~for managing~~ that manages a root directory file recording area.

5. (Currently Amended) A data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, ~~the file~~ the data storage medium storing data content comprising:

address information for a file set descriptor;

root directory file management information that is plurally recorded as main chaining information and reserve chaining information, the reserve chaining information being a duplicate of the main chaining information;

first address information, corresponding to an area in which the main chaining information and the reserve chaining information are recorded at a beginning of a volume space, that is recorded as part of the file set descriptor; and

second address information, corresponding to an area in which the main chaining information and the reserve chaining information is update recorded, that is recorded as part of the main chaining information and the reserve chaining information.

6. (Currently Amended) A data recording method for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the method comprising:

recording address information for a root directory in the data storage medium; and

recording <u>root directory file management information in the data storage medium, the recorded root directory file management information including</u> chaining information<u>, the chaining information</u> comprising ~~recording~~ start address information for an unrecorded area existing in a volume space ~~as part of root directory file management information~~,

<u>the root directory file management information being configured to be updated when a new file is recorded in the data storage medium by storing new root directory file management information in the unrecorded area for which start address information is recorded</u>

~~the unrecorded area for which start address information is recorded being used for updating root directory file management information when a new file is recorded on the data storage medium.~~

7. (Currently Amended) A data recording method as described in claim 6, wherein recording the chaining information further comprises recording the start address information for the unrecorded area using an indirect entry ~~for managing~~ <u>that manages</u> a root directory file recording area.

8. (Currently Amended) A data recording method for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the method comprising:

recording address information for a root directory <u>in the data storage</u> <u>medium</u>;

<u>recording invalid data not used for retrieving the volume/file structure in</u> <u>the data storage medium;</u> and

recording <u>root directory file management information in the data storage</u> <u>medium, the recorded root directory file management information including</u> chaining information <u>related to</u> ~~, the chaining information comprising~~ comprising ~~recording invalid data not used for retrieving volume/file structure before and~~ ~~after volume/file structure and a data file, and recording~~ invalid extent management information ~~for managing~~ <u>that manages</u> an invalid data recording area ~~as part of root directory file management information~~.

9. (Currently Amended) A data recording method as described in claim 8, wherein recording the chaining information further comprises recording the invalid extent management information using an indirect entry ~~for managing~~ <u>that</u> <u>manages</u> a root directory file recording area.

10. (Currently Amended) A data recording method for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording~~ ~~operations to a same area is limited~~, the method comprising:

recording address information for a file set descriptor <u>in the data storage</u> <u>medium</u>;

recording file set information in the data storage medium that includes comprising recording, as part of the file set descriptor, the file set descriptor having address information for an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space, the reserve chaining information being a duplicate of the main chaining information; and

recording chaining information in the data storage medium, the chaining information including comprising plurally recording address information of an area for update recording root directory file management information, the main chaining information and the reserve chaining information

the main chaining information and the reserve chaining information having address information of an area in which root directory file management information and the main chaining information and the reserve chaining information are update recorded.

11. (Currently Amended) A data recording apparatus for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information recorder that records address information for a root directory in the data storage medium; and

a chaining information recorder that records root directory file management information in the data storage medium, the root directory file

management information including start address information for an unrecorded area existing in a volume space ~~as part of root directory file management information~~,

the root directory file management information being configured to be updated when a new file is recorded on the data storage medium by storing new root directory file management information in the unrecorded area for which start address information is recorded

~~the unrecorded area for which start address information is recorded being used for updating root directory file management information when a new file is recorded on the data storage medium~~.

12. (Currently Amended) A data recording apparatus as described in claim 11, wherein the chaining information recorder records the start address information for the unrecorded area using an indirect entry ~~for managing~~ that manages a root directory file recording area.

13. (Currently Amended) A data recording apparatus for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the apparatus comprising:

an address information recorder that records address information for a root directory in the data storage medium; and

a chaining information recorder that records invalid data, not used for retrieving volume/file structure, in the data storage medium, ~~before and after volume/file structure and a data file~~, and that records root directory file management information in the data storage medium, the recorded root directory file management information including invalid extent management information~~,~~ ~~for managing~~ that manages an invalid data recording area~~, as part of root directory file management information~~.

14. (Currently Amended) A data recording apparatus as described in claim 13, wherein the chaining information recorder records the invalid extent management information using an indirect entry ~~for managing~~ that manages a root directory file recording area.

15. (Currently Amended) A data recording apparatus for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the apparatus comprising:

an address information recorder that records address information for a file set descriptor in the data storage medium;

a file set information recorder that records a file set descriptor in the data storage medium, the file set descriptor including~~, as part of the file set descriptor,~~ address information for an area in which main chaining information and reserve

chaining information are recorded at a beginning of a volume space, the reserve

chaining information being a duplicate of the main chaining information; and

a chaining information recorder that plurally records <u>address information of</u>

<u>an area in which root directory file management information, the main chaining</u>

<u>information and the reserve chaining information is update recorded</u>

~~main chaining information and reserve chaining information having~~

~~address information of an area in which root directory file management~~

~~information and the main chaining information and the reserve chaining~~

~~information are update recorded~~.

16. (Currently Amended) A data recording method for performing a file

recording process on a data storage medium for recording and reproducing a file

managed using a volume/file structure ~~in which a number of data recording~~

~~operations to a same area is limited~~, the method comprising:

recording address information for a root directory <u>in the data storage</u>

<u>medium</u>; and

recording <u>root directory file management information in the data storage</u>

<u>medium, the root directory file management information including</u> chaining

information, ~~comprising recording~~ <u>having</u> start address information for an

unrecorded area existing in a volume space ~~as part of root directory file~~

~~management information~~,

<u>the root directory file management information being configured to be</u>

<u>updated when a new file is recorded on the data storage medium by storing new</u>

root directory file management information in the unrecorded area for which start address information is recorded

~~the unrecorded area for which start address information is recorded being~~ ~~used for updating root directory file management information when a new file is~~ ~~recorded on the data storage medium~~.

17.   (Currently Amended) A data recording method as described in claim 16, wherein recording the chaining information further comprises recording the start address information for the unrecorded area using an indirect entry ~~for managing~~ that manages a root directory file recording area.

18.   (Currently Amended) A data recording method for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the method comprising:

recording address information for a root directory in the data storage medium;

recording invalid data not used for retrieving the volume/file structure in the data storage medium; and

recording root directory file management information in the data storage medium, the root directory file management information including chaining information having ~~chaining information comprising recording invalid data not used for retrieving volume/file structure before and after volume/file structure and~~

a data file, and recording invalid extent management information for managing that manages an invalid data recording area as part of root directory file management information.

19. (Currently Amended) A data recording method as described in claim 18, wherein recording the chaining information further comprises recording the invalid extent management information using an indirect entry for managing that manages a root directory file recording area.

20. (Currently Amended) A data recording method for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

reproducing file set information, the reproduced file set information including comprising reproducing address information of an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space using a file set descriptor, the reserve chaining information being a duplicate of the main chaining information;

recording root directory file management information including chaining information that includes comprising reproducing, using the main chaining information or and the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information, and

~~plurally~~ recording <u>address information of an area in which the root directory file management information, including the main chaining information and the reserve chaining information, is update recorded</u>

~~the main chaining information and the reserve chaining information having address information of an area in which the root directory file management information and the main chaining information and the reserve chaining information are update recorded~~.

21. (Currently Amended) A data recording apparatus for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the apparatus comprising:

an address information recorder that records address information for a root directory <u>in the data storage medium</u>; and

a chaining information recorder that records <u>root directory file management information in the data storage medium, the root directory file management information including</u> start address information for an unrecorded area existing in a volume space ~~as part of root directory file management information~~,

<u>the root directory file management information being configured to be updated when a new file is recorded on the data storage medium by storing new root directory file management information in the unrecorded area for which start address information is recorded</u>

~~the unrecorded area for which start address information is recorded being~~

~~used for updating root directory file management information when a new file is~~

~~recorded on the data storage medium.~~

22.   (Currently Amended) A data recording apparatus as described in claim 21, wherein the chaining information recorder records the start address information for the unrecorded area using an indirect entry ~~for managing~~ that manages a root directory file recording area.

23.   (Currently Amended) A data recording apparatus for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the apparatus comprising:

an address information recorder that records address information for a root directory; and

a chaining information recorder that records invalid data not used for retrieving the volume/file structure ~~before and after volume/file structure and a data file~~, and that records root directory file management information having invalid extent management information ~~for managing~~ that manages an invalid data recording area ~~as part of root directory file management information~~.

24.   (Currently Amended) A data recording apparatus as described in claim 23, wherein the chaining information recorder records the invalid extent

management information using an indirect entry ~~for managing~~ that manages a root directory file recording area.

25. (Currently Amended) A data recording apparatus for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the apparatus comprising:

an address information reproducer that reproduces address information for a file set descriptor;

a file set information reproducer that reproduces address information of an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space using the file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

a chaining information recorder that records root directory file management information including ~~reproduces, using~~ the main chaining information ~~or~~ and the reserve chaining information, ~~following the main chaining information or the reserve chaining information, or root directory file management information that plurally records the main chaining information and the reserve chaining information having~~ and that records address information of an area in which the root directory file management information, including ~~and~~ the main chaining information and the reserve chaining information, are update recorded.

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26. (Currently Amended) A data reproducing method for performing a file reproducing process from a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the method comprising:

reproducing address information for a file set descriptor;

reproducing file set information that includes ~~comprising reproducing~~ address information for an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space using the file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

reproducing root directory file management information that includes main chaining information and reserve chaining information

~~recording chaining information comprising reproducing, using the main chaining information or the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information.~~

27. (Currently Amended) A data reproducing apparatus for performing a file reproducing process from a data storage medium for recording and reproducing a file managed using a volume/file structure ~~in which a number of data recording operations to a same area is limited~~, the apparatus comprising:

an address information reproducer that reproduces address information for a file set descriptor;

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a file set information reproducer that reproduces address information for an area in which the main chaining information and the reserve chaining information are recorded at a beginning of a volume space using the file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

a chaining information recorder that reproduces <u>root directory file management information, including the main chaining information and the reserve chaining information,</u> ~~using the main chaining information or the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information~~.

28. (Previously Presented) A data storage medium as described in claim 3, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

29. (Previously Presented) A data recording method as described in claim 8, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

30. (Previously Presented) A data recording apparatus as described in claim 13, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

31. (Previously Presented) A data recording method as described in claim 18, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

32. (Previously Presented) A data recording apparatus as described in claim 23, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.